MODELLING OF DYNAMIC CAPABILITIES: A SYSTEM DYNAMICS APPROACH

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ABSTRACT

Increasing attention to dynamic capabilities perspective has resulted in many researches with a number of methods, analyzes and approaches, but not followed by increase in simulations and models, like system dynamics model. Dynamic capabilities exhibit in the process of several elements as leverage elements for enabling process such as sensing, learning, integrating, coordinating and sub-elements as underlying elements for basic routines, whereas system dynamics is a systemic modelling that can be applied to exploit, explore and reconfigure organizational resources and capabilities in a system for analyzing and understanding how complex the environment changes over time. By considering that dynamic capabilities approach and system dynamics are closely intertwined in term of system, the purpose of this paper is to develop dynamic capabilities model based on system dynamics approach along with associated to business environment.The model shows that the reinforcing loop of leverage elements affected by underlying elements plays an important role in balancing to a changing business environment. The more increase in exploiting and exploring all leverage elements and underlying elements of dynamic capabilities, the more increase in organizational dynamic capabilities capabilities and it leads to the more organizational ability to maintain the existence of organizations in highly dynamic business environment.

INTRODUCTION

The organizational environment has been changed over time and described as dynamic, hyperturbulent, unpredictable, and hypercompetitive. There are many changes in organizational environment such as changes in technology, social, politic, legal or economic. These changes are originated in both the external environment and the internal of the organizations (Poulis & Jackson, 2006).

For decades, the predominant logic of organizational effectiveness has been that an organization's fit with its environment, its execution, and its predictability are the keys to its success (Lawer & Worley, 2006). Adapting to a major environmental change is an important challenge for organizations, and how organizations adapt to changes in their environments has been a prominent theme in organization and strategy research (Benner, 2009).

From several paradigms associated with the existence of the organization in achieving and retaining competitive advantages, dynamic capabilities paradigm has been viewed as viable means for managing in turbulent environments (Pavlou & Sawy, 2011). This addresses the performance of firms in adapting within changing environments (Teece et al.,1997) and focussing on processes which frequently perform adjustments of the firm's configuration to match the external conditions (Jekel, 2009).

Teece et al. (1997) define dynamic capabilities as a firm's ability to integrate, build, and reconfigure competencies to address environmental changes and Eisenhardt & Martin (2000) define as the organizational and strategic routines by which firms achieve new resources configurations as markets emerge, collide, split, evolve and die. They are not abilities but processes to address or initiate market change. Whereas, Zollo & Winter (2002) define dynamic capabilities not only as abilities, capacities and activities but also as processes and routines and Collis (1994) defines as the capability to develop the capability that innovates faster.

All definitions contain two prominent groups of words that can be considered as organizational capabilities to be more dynamic. The first group related to enabling processes consists of competency and capability (Teece & Pisano, 1994), ability and competency (Teece et al.,1997), ability (Zahra et al., 2006), capacity (Helfat, 2007; Teece, 2007; Winter,2002; Zahra et al.,2006) and the second group related to basic routines consists of process and routine (Eisenhardt & Martin, 2000), pattern and routine (Zollo & Winter, 2002; Nelson & Winter, 1982), and features or practices (Molin,2001).

Four leverage elements commonly described in dynamic capabilities as enabling processes and basic routines are sensing, learning, integrating and coordinating and some underlying elements (Pavlou & Sawy, 2011) that can play a pivotal role in developing dynamic capabilities when the opportunity or need arise (Zahra et al., 2006). Sensing capability refers to a firm's ability to learn about its market environment (Day, 1994). Learning capability is the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends (Cohen & Levinthal, 1990). Integrating capability is about knowledge integration concerning as the synthesis of existing knowledge and acquired knowledge (Kogut & Zander, 1992), and coordinating capability constructed by coordination is how to manage dependencies between activities (Malone & Crowston, 1994).

Lawer &Worley (2006) argue that most organization design and management models are born in an age when environments are stable or at least predictable. When the environment is changing slowly or predictably, these are fine models. But the pace and uncertainty of change, brought on by globalization, technological innovation, and political change, strongly argue for a new model.

Simulation models expressed in system dynamics models might be helpful in such complex initiatives and are widely used in business strategy and policy assessment (Sterman, 1992) which in accordance with the role of dynamic capabilities. Dynamic capabilities have been viewed as strategic approach to organizations of managing dynamic environments by exploring and exploiting their capabilities routinely, whereas system dynamics is a systemic model for understanding and analyzing how complex environment as a system changes over time. When dynamic capabilities exhibit embedded characteristics during the development process (Nelson & Winter, 1982; Barney & Clark, 2007), and it should be embedded in routines that can be produced via system operation (Chen & Lee, 2008).

From those points, it can be concluded that dynamic capabilities view and system dynamics are closely intertwined. They represent essential complement each other in terms of system and sub system. As a system, dynamic capabilities consist of several elements as leverage elements for enabling process and sub-elements as underlying elements for basic routines and those can be constructed in the system dynamics modelling.

In recent years, the dynamic capabilities view, has gained increasing attention to the management literature, not only in the concept's original domain (strategic management) but also in many other areas within business administration (Barreto, 2010). Some researchers in

strategic management build some models of dynamic capabilities related to some areas of strategic goal of organizations, like firm performance (Zot, 2000; Baoshan & Dong, 2009), complex environments (Poulis & Jackson, 2006), inovation (Liao & Kickul 2009; Borch & Madsen, 2007), entrepreneurship (Borch, 2004), innovation product and market performance (Yalcinka et al., 2007), and new product development (Pavlou & Sawy, 2005).

However, the modelling of dynamic capabilities using simulation model like system dynamics in methodology still remain underdeveloped. It has proven by study of Eriksson (2014) that there are over a third of the 373 articles are conceptual (136 articles), 232 articles are empirical, and only 5 articles are based on simulation data.

Overcoming the limitation on applying system dynamics model to dynamic capabilities is a main factor explained in this study by combining the dynamic capabilities view and system dynamics modelling. The effect of this study further will contribute to the field of strategic management in analyzing the unstable environment in which the organizations operate, formulating and implementing strategies as well as to the field of system dynamics in modelling, simulating and producing more policies in business strategies.

So, this study is about providing a model of dynamic capabilities based on system dynamics approach by conducting an extensive review of the dynamic capabilities and system dynamics literature and by exploring leverage elements and underlying elements of sensing, learning, integrating and coordinating along with associated to a changing business environment of organizations.

LITERATURE REVIEW

Competitive Advantage

The development of theories about competitive advantage has occupied the attention of the management community and it has been central to the study of strategic management. Strategic management has been studied from various aspects, which has resulted in a wide range of different frameworks, paradigms and theories. The field of strategic management is organized around a central research question of 'why do some firms persistently outperform others?' (Barney & Clark, 2007). This suggests that firms achieve their sustained competitive advantage by implementing strategis, which exploit and explore their resources and capabilities respond to environmental opportunities.

Teece et al. (1997) categorize the theory of competitive advantage into two models, namely models of strategy emphasizing the exploitation of market power and models of strategy emphasizing efficiency. The first models consist of Competitive Forces by Porter (1980) and Strategic Conflict approach by Shapiro (1989), and the second models consist of Resources-based View (Wernerfelt, 1984) and Dynamic Capabilities Approach (Teece, 1994).

Porter's competitive forces approach emphasizes the actions of firms in creating defensible positions against competitive forces. The five industry-level forces-entry barriers, threat of substitution, bargaining power of buyers, bargaining power of suppliers, and rivalry among industry incumbents (Porter, 1980) determine the inherent profit potential of an industry or subsegment of an industry. This 'five-forces' framework provides a systematic way of thinking about how competitive forces work at the industry level and how these forces determine the profitability of different industries and industry segments (Teece et al., 1997). The approach of strategic conflict utilizes the tools of game theory to analyze the nature of competitive interaction between rival firms. The main thrust of work in this tradition is to reveal how a firm

can influence the behavior and actions of rival firms and thus the market environment (Teece et al., 1997).

The resource-based view of the firm (RBV) is an influential theoretical framework for understanding how competitive advantage within firms is achieved and how that advantage might be sustained over time (Barney & Clark, 2007). This perpective focuses on how organizations acquire and control their valuable, rare, inimitable, and nonsubstitutable resources. The origins of the resource-based view can be traced back to Penrose (1959) who points to the fact that a firm is a collection of physical, human and intangible resources, which are deployed by administrative decisions (Kumlu, 2014), but it's principal development occured between 1984 and the mid-1990s (Pavlou & Sawy, 2011). This approach is about how organizations as a bundle of resources capabilities explore all those resources as the basis for their competitive strategies in facing unstable environment.

The increasingly volatile environment of firm has entailed recent popularity of the notion that dynamic capabilities approach is better than resources-based view to address in such rapidly changing environments. The rationale is that resources-based view has not adequately explained how and why certain firms have competitive advantage in situations of rapid and unpredictable change (Eisenhardt & Martin, 2000). While the resources-based view emphasizes resources picking, dynamic capabilities stress in resources renewal by reconfiguring existing resources into new functional competencies (Pavlou & Sawy 2005). Consequently, the source of competitive advantage lies on dynamic capabilities of firms by which firm managers integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece et al., 1997).

Dynamic Capabilities

The dynamic capabilities view originates in spirit from Schumpeterian, where competitive advantage is based on 'creative destruction' of existing resources and 'novel recombination' of new, potentially rent-generating functional competencies (Teece et al., 1997). Dynamic capabilities have been defined as the capacity to renew competencies so as to achieve congruence with the changing business environment (Ambrosini et al., 2009) by adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competencies (Teece et al., 1997). Zahra & George (2002) regard dynamic capabilities neither as a firm's abilities nor as processes but as capabilities to match customer demands and competitor strategies.

Dynamic capabilities aim at matching internal resource configurations with the environment (Teece et al., 1997). Hence, it is valid to assume that dynamic capabilities include activities which lead to the identification of internal strengths and weaknesses as well as external opportunities and threats. The effect of the dynamic capability refers to the firm's pursuit of a match between internal strengths and weaknesses and external opportunities and threats (Jekel, 2009).

As operating routines, (Zollo & Winter, 2002; Zahra et al., 2006), dynamic capabilities involve some elements of capability as enabling process to reconfigure existing operating capabilities of organizations and sub elements for processing and constructing as routinely. The success of organizations in applying dynamic capabilities depends on how they optimize, explore and exploit those elements and sub elements routinely.
Reviewed from some articles and journals showed that there are some elements of dynamic capabilities, such as sensing capabilities, learning capabilities, integration capabilities and

coordination capabilities (Pavlou & Sawy 2005; 2011), adaptive capability, absorptive capability, innovative capability and networking capability (Parida, 2008); sensing capability, absorptive capability, integrative capability and innovative capability (Hou & Chang, 2009); resource reconfiguration and integration capabilities, resource acquisition capabilities, and learning capabilities, and strategic path aligning capabilities (Borch & Madsen, 2007); renewing capabilities and generating capabilities (Ambrosini et al., 2009). The four elements of sensing capabilities, learning capabilities, integration capabilities and coordination capabilities are mostly used by students and researchers in their work of dynamic capabilities (Pavlou & Sawy 2005; 2011). These four elements can be developed as a function of the firm's leveraging competence routinely in achieving and maintaining competitive advantage of the firms.

System Dynamics

System Dynamics is a computer-aided approach to policy analysis and design. It applies to dynamic problems arising in complex social, managerial, economic, or ecological systems literally any dynamic systems characterized by interdependence, mutual interaction, information feedback, and circular causality (System Dynamics Society).

According to Schneider et al. (2015) that system dynamics, initially proposed by Forrester (1961) is an approach to understanding the behavior of complex systems over time. It is a powerful tool that helps assess complex issues involving delays, feedback and nonlinearities and links causal mapping diagrams to computer simulation models (Harris & Williams 2005) and can be applied to any dynamic system, with any time and spatial scale (Sterman, 2000).

As a model, system dynamics model is a means of analyzing the behavior of intricate socioeconomic systems to indicate how organization and policy affect behavior over time (Sterman, 2000) and as a methodology, it is for studying and managing complex feedback systems, such as one finds in business and other social systems (System Dynamics Society).

System dynamics uses concepts drawn from the field of feedback control to map the dynamic relationships in a system, using tools such as causal loop diagrams (Sterman, 1992). These tools are based on the assumption that the world is made up of closed loop structures where an action drives a result, which leads to information, which in turn gives raise to another action (Kylander, 2007).

Two popular model types are offered in system dynamics namely Causal Loop Diagram (CLD) and Stock-and-Flow Diagram (SFD). A causal loop diagram is a tool for revealing the causal relationships among a set of variables (or factors) operating in a system (Maani & Cavana (2000) and it is flexible and useful tools for diagramming the feedback structure of structure of systems in any domain (Sterman, 2000). Whereas, a stock flow diagram is generally constructed from a causal loop diagram (Maani & Cavana, 2000) and emphasizes underlying physical structure (Sterman, 2000). To get a more detailed and quantitative view on a system, a CLD can be transformed to a simulation-enabling SFD (Schneider et al., 2015). Two kinds of loops in system dynamics are positive loops which tend to amplify any disturbance and to produce exponential growth, and negative loops that tend to negate any disturbance and to move the system towards an equilibrium point or goal (Papageorgiou & Hadjis, 2011).

MODELLING OF DYNAMIC CAPABILITIES

The aim of this study is about providing a basic model of dynamic capabilities constructed by Causal Loop Diagram of system dynamics. The modelling technique begins with the proposed model, conceptualization model and ends with modelling dynamic capabilities.

The Proposed Model of Dynamic Capabilities

A model is a construction of a reality (Schwaninger & Grosser, 2008) or an abstraction of something (McLeod, 1999), whereas modelling is a process by which models are built (Schwaninger & Grosser, 2008).

The proposed model is based on the two models of dynamic capabilities developed by Pavlou & Sawy in 2005 and 2011. The model of 2005 has a circular pattern of the sequence of sensing, learning, coordinating and integrating whereas the model of 2011 has a linear pattern of the sequence of sensing, learning, integrating and coordinating. In terms of system dynamics, the modelling of dynamic capabilities developed in this study is a systemic pattern of the sequences of sensing, learning, integrating and coordinating.

The following figure 1 describes the framework of the proposed dynamic capabilities model explaining a conceptual linkage between those four factors.
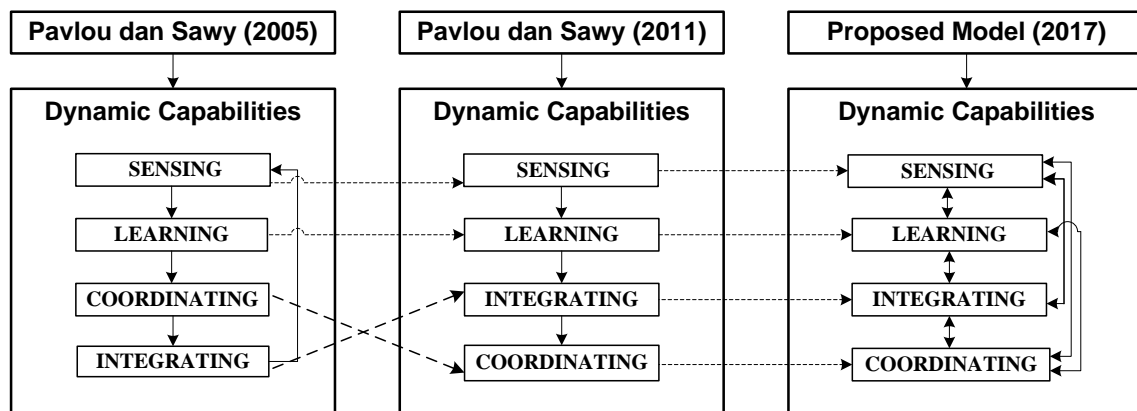

FIGURE 1
THE PROPOSED MODEL OF DYNAMIC CAPABILITIES

The Causality Relationship of Dynamic Capabilities

The important thing to build a model based on system dynamics is how to build the causality relationship of all elements and sub elements logically and theoretically. In this study, the modelling developed is about dynamic capabilities by exploring all elements of sensing, learning, integrating and coordinating as enabling factors and all sub elements as basic routines and reconfiguring causality relationship all those elements.

Pavlou & Sawy (2005; 2011) explain that sensing the environment is captured by the construct of market orientation (Kohli & Jaworski, 1990), learning capabilities by absorptive capacity (Cohen & Levinthal, 1990), integrating resources by collective mind (Weick & Roberts,

1993) and coordinating activities by coordination capability (Malone & Crowston, 1994). This leads to a concept of intersection and causality of all elements and sub elements as a basic reference in the modelling of the dynamic capabilities.

The following matrix (table 1) explains the relationship of the four elements of sensing, learning, integrating and coordinating.

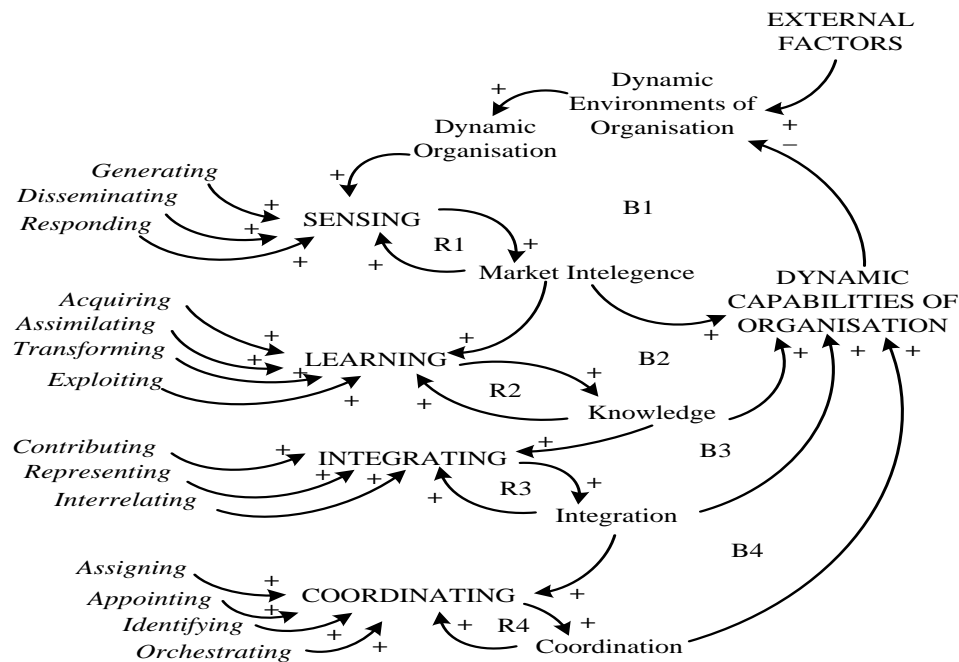| Table 1 RELATIONSHIPS OF DYNAMIC CAPABILITIES ELEMENTS (adopted from Pavlou & Sawy, 2005; 2011)			
	Sensing / Market Orientation	Learning / Absorptive Capability	Integrating / Collective Mind
LEARNING / ABSORPTIVE CAPABILITY	Market orientation deals with learning (Hurley & Hult, 1998, Sinkula, 1994) and it impacts the ability to detect market opportunities (Cohen & Levinthal, 1990, Zahra & George, 2002)		
INTEGRATING / COLLECTIVE MIND	A collective system helps to better sense new opportunities in the environment (Garud & Nayyar 1994, Weick & Roberts 1993, Zahra & Geroge, 2002)	Learning facilitates collective mind since incomplete knowledge restricts the ability to interrelate (Van den Bosch et al, 1999). Also, Crowston and Kammerer (1998), argue that collective mind cannot develop without learning because it requires shared cognitive maps.	
COORDINATING / COORDINATION CAPABILITY	Superior coordination has been shown to facilitate the dissemination of ma(Vorhies & Harker, 2000)	Teece, Pisano & Shuen (1997) argue that learning requires coordinated procedures. By coodinating the allocation of time and resources, Nonaka (1995) argues that groups can create knowledge. Finally, Van den Bosch et al. (1999) view coordination as an integral driver of absorptive capacity.	Coordination depends on a common language, a shared meaning, group cognitive maps, and interpretive schema (Dalt & Weick, 1984). Collective mind is the result of coordination that captures resources synergies and enable resources to be pooled together (Galunic & Eisenhardt, 2001)

Moreover, Pavlou & Sawy (2011) explain that sensing capabilities consist of three basic routines i.e, generating market intelligence (Galunic & Rodan, 1998), disseminating market intelligence (Kogut & Zander, 1996), and responding to market intelligence (Teece, 2007), learning capabilities consist of four basic routines i.e, acquiring, assimilating, transforming, and exploiting knowledge (Zahra & George, 2002), integrating capabilities consist of three basic routines i.e, contributing individual knowledge to the group (Okhuysen & Eisenhardt, 2002), representation of individual & group knowledge Crowston & Kammerer, 1998), interrelation of diverse knowledge inputs to the collective system (Grant, 1996), and coordinating capabilities consist of four basic routines i.e, assigning resources to tasks (Helfat & Peteraf, 2003), appointing right persons to right tasks (Eisenhardt & Brown, 1999), identifying synergies among tasks, activities, and resources (Eisenhardt & Galunic, 2000), orchestrating activities (Henderson,

1994). These all factors are about the sub elements of basic routines in driving elements of enabling process and have causality relationship each other in reconfiguring dynamic capabilities.

Modelling of Dynamic Capabilities

System dynamics modeling is a set of conceptual tools that enable business process designers to build computer simulations of complex business process behaviors. System dynamics models provide accurate description of system behavior along the time dimension (An & Jeng, 2005) and it brings the advantage of modeling the complexity by combining the technical grounding from mathematics and engineering with the nonlinearities of social sciences, organizational behavior, and psychology (Chaker et al., 2015).

As explained before, two model types of system dynamics are Causal Loop Diagrams (CLD) and Stock-and-Flow Diagrams (SFD). In this study, the modeling is based on a Causal Loop Diagram (CLD) that produces a basic model of dynamic capabilities by exploiting, exploring and reconfiguring four leverage elements of dynamic capabilities. The model will provide a microscopic view on their causalities in facing such a dynamic environment. The figure of modelling of dynamic capabilities CLD can be seen in Figure 1 below.

FIGURE 1
CAUSAL LOOP DIAGRAM (CLD) OF DYNAMIC CAPABILITIES

DISCUSSSION

Today's organizations operate in a more dynamic external environment. The movement and change from the environment have been rapid, uncertain and unpredictable and this makes achieving and maintaining competitive advantage more difficult. In order to generate competitive

advantages, firm's resources must be properly leveraged or managed (Peteraf, 1993). Decision making in turbulent environments is challenging because managers must decide and act rapidly (Carlsson & El Sawy, 2008).

The organization's external environment is further complicated by the tendency towards environmental change (Worthington & Britton, 2006), and it refers to the requirements and expectations of clients and parties, to the nature and impact of regulation and to the changing nature and implications of technology and many other factors (Salaman & Ach, 2003). Moreover, Worthington & Britton (2006) argue that the organization's external environment is further complicated by the tendency towards environmental change.

The dynamic external factors lead to the more dynamic environment faced by today's organizations, and this leads to organizations to be more dynamic. Dynamic organizations reflect ability in exploring resources and capabilities to respond changes of their external business environment rapidly and continuously over time. The ability to do this systematically has been referred to as dynamic capability (Eriksson, 2013)

Related to dynamic capabilities approach, dynamic organizations are organizations that respond all such environmental changes by exploiting elements of sensing, learning, integrating and coordinating and all underlying factors. In this case, dynamic capabilities have a role how to constantly reconfigure, renew, and redeploy its resources and capabilities to better capture and exploit the changing opportunities (Teece et al., 1997).

Figure 1 shows a causal loop diagram of dynamic capabilities explaining the causality of elements of dynamic capabilities in facing dynamic and uncertain environment. There are four loops of reinforcing (R1, R2, R3 and R4), explaining the role of four leverage elements of sensing, learning, integrating and coordinating expressed in mutually reinforcing and the effect of their basic routines in balancing the effect of external factors of organizations. In the condition of uncertain environment, dynamic organizations routinely and continuously exploit and explore those leverage elements and basic routines. The more increase in those leverage elements leads to the more increase in market intelligence, knowledge, integration and coordination. Furthermore, four loops of balancing (B1, B2, B3, and B4) explain the role of those leverage factors in balancing the dynamic environment. The more increase in dynamic capabilities caused by the more increase in causality of those leverage elements affects negatively and causes the more decrease in dynamic environment faced by organizations.

In daily activities with a competitive environment, organizations must first improve their ability in sensing the movement of environment to gather market intelligence on market needs by identifying opportunities and threats. Factor of sensing depends on the basic routines of generating, disseminating and responding. These three basic routines affect positively in increasing the organizational sensing. The more the increase in these basic routines, the more increase the organizational sensing. The result of this increase leads to the increase in organizational market intelligence which turns back to increase organizational sensing (reinforcing loop of R1). Furthermore, the balancing loop of B1 shows that as market intelligence increases, dynamic capabilities of organizations increases which causes a decrease the dynamic environment faced by organizations.

There has been increasing awareness among firms across global cultures about the importance of knowledge in achieving and sustaining organizational competitive performance (Stephen et al., 2017). Learning is the crucial component in the transformation from the traditional organization to developmental organization (Gilley & Maycunich, 2000). Once a market opportunity is identified, it must be addressed with new products, which require a

decision to revamp existing operational capabilities with learning, and new knowledge and skills (Teece, 2007). Cohen & Levinthal, (1990) further argue that there is a reciprocal two-way relationship between sensing and learning capabilities because learning enhances the ability to detect new opportunities.

Competition makes resources scarce and valuable because the greater the competition for resources is, the more difficult they are obtain. For every organization to take advantage of external opportunities in a dynamic environment, they must exploit their learning to find new solutions by creating new knowledge and reconfiguring existing capabilities. The increase in market intelligence affects the increase in organizational learning. The more increase in organizational learning depends on four leverage factors, such as, acquiring, assimilating, transforming and exploiting. The increase in organizational learning leads to increase organizational knowledge, and this leads back to increase learning organizations (reinforcing loop of R2). This reinforcing loop affects the organizational dynamic capabilities. The more of knowledge, in turn, would cause an increase in dynamic capabilities of organizations and therefore affect to decrease to dynamic environment faced by organizations (balancing loop of B2).

Learning focuses on building development capacity at individual, team, and organizational level (Gilley & Maycunich, 2000). Oganizations learn only through individuals that learn and it does not guarantee organizational learning (Senge, 1990). On the contrary with Salaman & Asch (2003), that much strategic thinking in organizations is done in and by groups. Morover, groups can be highly creative; they ensure that various key interest are presented; they help to make the decision acceptable; they ensure that key data sources are involved and they help to spread responsibility(Salaman & Asch, 2003). Therefore, organizations must integrate their individual knowledges into a collective system or groups.

The success of integrating capabilities of organizations depends on the basic routines of contributing, representing, and interrelating. The increase in those basic routines affects the increase in leverage factor of integrating capabilities. The more increase in integrating capabilities causes the more increase in integration and it leads back to the more of integrating capabilities of organizations (reinforcing loop of R3). This reinforcing loop affects to more increase to dynamic capabilities in decreasing dynamic environment of organization (balancing loop of B3).

The new configurations of operational capabilities require effective coordination of tasks and resources and synchronization of activities (Helfat & Peteraf, 2003). In terms of organizational core competencies, Prahalad & Hamel (1990) define core competencies as the collective learning in organizations, especially how to coordinate diverse production skills and integrate multiple stream of technologies. Coordinating capability is defined as the ability to orchestrate and deploy tasks, resources, and activities in the new operational capabilities. These leverage elements of coordinating capabilities depend on the basic routines of assigning, appointing, identifying, and orchestrating. The ability of organizations in exploring theses basic routines affects to coordinating capabilities of organizations. This would affect an increase in leverage factor of coordinating and affects in increase of coordination of organizations. This leads back to increase coordinating capabilities (reinforcing loop of R3). Moreover, the power of coordination generated affects positively in increasing dynamic capabilities and therefore affects to decrease to dynamic environment faced by organizations (balancing loop of B4).

CONCLUSSION

This study is about how organizational ability to reconfigure all resources and capabilities that driving configuration of dynamic capabilities fit to dynamic environment expressed in a system dynamics model. The model is constructed systematically by exploiting and exploring the leverage elements of sensing, learning, integrating, coordinating and the effects of basic routines in order to achieve and maintain competitive advantage of organizations to such dynamic and changing environment faced by organizations.

The modelling process of dynamic capabilities based on Causal Loop Diagram (CLD) of system dynamics describes the causality of those elements expressed in the role of reinforcing loop and balancing loop. The more increase in the leverage elements of dynamic capabilities leads to the more increase in market intelligence, knowledge, integration, coordination and the more increase in dynamic capabilities caused by the more increase in causality of those leverage elements affects negatively and causes the more existence of organizations in highly changing organization environment.

IMPLICATION (FUTURE DIRECTIONS)

This study contributes to the field of organizational strategy by applying abilities of organizational dynamic capabilities, such as the ability in explicitly, systematically and simultaneously exploiting, exploring and adjusting multiple strategies of sensing, learning, integrating and coordinating, as well as the ability in dynamically adjusting strategies to high dynamic environment.

The model constructed is a basic model of dynamic capabilities, expressed in Causal Loop Diagram (CLD) and restricted to four elements. Nevertheless, it can be a reference and guideline for researchers and academics, business practitioners and managers, and modelers. Theoretically, the model is helpful and will allow researchers and academics to perform further their analysis by better conceptualizing, explaning, operating, and measuring more elements of dynamic capabilities. Practically, that it will also help give business practitioners and managers more specific, more understanding and actionable guidelines to make high-quality decisions in facing turbulent environments. For modellers, it will help perform their ability in modelling, analysing and constructing Causal Loop Diagram (CLD) and Stock Flow Diagrams (SFD) about organizational behavior in a more comprehensive manner.

Finally, this model can be not only applied and tested, but also also refined and redefined in some fields of management strategic in producing some policies of business performance, innovation product, product quality, human resource management, leadership, learning organization and knowledge management.

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